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# THE BRYOLOGIST

VOL. XII

MARCH 1909

No. 2

## LICHENO-ECOLOGIC STUDIES FROM BEECHWOOD CAMP.

(Read at the Sullivant Moss Society Meeting, Baltimore, Dec. 30, 1908.)

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Beechwood camp lies by the roadside, in a two-hundred acre forest, four and one-half miles from Oxford, Ohio. This forest, much of it practically undisturbed, was obtained from the government by the Hueston family and is now in the hands of the third generation of Huestons, through whose courtesy the department of botany of Miami University is able to use it during a part of each summer as an outing place for botanical study. The Hueston family of the present generation takes great pride in this forest, which is known far and wide, and every assurance is given that it will not be destroyed for many years. A considerable number of the trees have attained practically their full size, and in the portions where beeches abound, offer shade so dense that very little herbaceous vegetation exists under them. Trees have fallen from time to time and have been left undisturbed so that logs and stumps in all stages of decay abound in various portions of the forest. With all conditions regarding light at hand; a few high and nearly bare hills giving xerophytic conditions; an abundance of streams, springs, ledges of rocks, sandy banks; low flood plains, partly alluvial and in part sandy or gravelly, the environment of the camp is quite ideal for ecologic and taxonomic work.

The camp was occupied for the first time last August (1908), and the seed plants, the ferns, the mosses, the lichens and the fungi were all studied more or less from the taxonomic point of view. Nor was the ecologic work initiated confined to the lichens, but was extended to all kinds of plants. However, especial attention was given to certain problems in lichen ecology and to a beginning of tracing the succession of fungi on the logs and stumps. It may be questionable whether a presentation of beginnings is at all worth while, for no data of value have been secured. However, it is the belief of the writer that the methods and aims, simple as they are, are worth stating with a view to stimulating others to similar work. Doubtless much of the more difficult and extended work that the writer has undertaken on lichen ecology will not endure the sifting to which ecology is now being subjected, but it is believed that, whatever more difficult and uncertain lines of research may be undertaken later at the camp, the results that may come from the simple experiments now in progress will be secure and valuable.

We hear and see much stated about the slow growth of lichens, and occasionally one comes upon very opposite statements, such as the growth of podetia and the production of apothecia in certain *Cladonias* in a single season, and the migration of *Umbilicarias* a half a dozen miles along a high rocky ledge in as many years; but thus far there seems to be little if any accurate knowledge regarding such matters. We are also sometimes told



PLATE III. Beechwood Camp. Rail fence and beech trees by roadside.  
Near Oxford, Ohio.

when spores are most abundant in lichens, but this problem also needs careful observation. Not all the problems of interest can be worked out in a single place, and the writer has begun work similar to that at Beechwood camp, on the forest reserve of Berea College, in the foothills of the Cumberland mountains, in Kentucky. In the mountains, certain conditions and plants not found in Ohio can be studied. Neither the matter of periodicity in spore production, nor the ecologic work begun in Kentucky will be considered in this paper; but it may be suggested that studies in spore production is a matter easily handled, and one that would give results of value.

In all the ecologic studies begun at Beechwood camp, the dates of study are recorded and the location of each study carefully noted. However, these data are of no value in presentation and will be omitted. The first study undertaken is as follows: A rectangle eight centimeters square was marked in a patch of *Cladonia fimbriata*, covering a decorticate log. A tack was driven into the log at each corner of the area, and small twine was run around the tacks to enclose the area. The horizontal thallus appeared young, having scattered squamules, covering perhaps one-sixth of the area enclosed, and many of them so small as to be visible only under a hand lens. There were no podetia within the area, though they were plentiful on other portions of the same log. The second study is very similar, being the same species on the same log, with the horizontal thallus better developed and much more thickly disposed upon the substratum, but still no podetia. The purpose in both is to watch rate of development. The conditions as position on the log and resulting amounts of light and moisture received, etc., are all carefully noted.

Studies number three to seven inclusive are all being conducted to ascertain the rate of growth and fruit production in certain lichens. The positions with reference to light and moisture are all noted carefully as well as the present size of the plants and condition as to fruiting. Small twine is stretched and fastened to small nails in such a way as to lie directly over the edges of the thalli at certain points, so that a more certain way may be had for noting growth and its direction, than mere measurements. The plants under observation are *Parmelia caperata*, *Parmelia Borreri*, *Parmelia saxatilis*, and *Graphis scripta* in various conditions of development.

Study number eight is as follows: A levee of limestone fragments of various sizes was laid along a stream about thirty years ago, and is now covered with the crustose lichens which commonly grow upon such rocks near the soil in exposed places. A section of the levee seventy c.m. long, was removed and replaced by similar limestone fragments, taken from the bed of the stream and devoid of lichens. On either side of the portion removed the lichens are growing in profusion on the rocks of the levee, and the rate of invasion and ecesis\* in the new portion of the levee and the successions following first establishment may easily be followed. The levee is on low ground and not over a half meter high at any point. Therefore the rate of invasion, ecesis\* and succession will doubtless be as rapid as could be expected on such rocks anywhere, except, perhaps in a shaded place, the levee being in an open field.

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\*Ecesis—from the Greek word meaning "The act of coming to be at home." Referring to the germination and establishment of plant invaders.

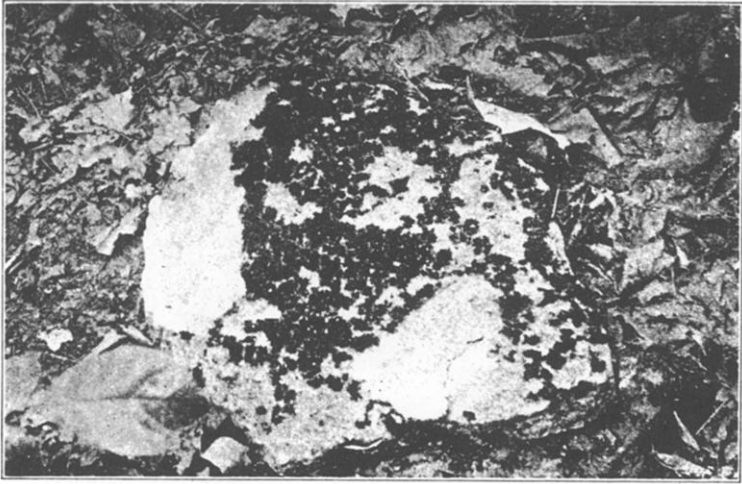


FIG. 1. *Grimmia apocarpa* on rock.

Study number ten is a new sycamore (*Platanus occidentalis*) board replacing an old board in a section of board fence, whose other boards are abundantly covered with *Placodium microphyllum*. The new board is the second from the top of the fence, and the rate of ecesis and something of direction of invasion may be noted. Another study similar to this, not yet numbered, is a new section of picket fence. The old pickets were covered on the north side with *Lecanora varia*, *Physcia stellaria* and some *Parmelias* and other lichens. The old pickets on either side of the new ones are now covered with the same lichens as is also the horizontal framework of the fence to which the new pickets were nailed. This furnishes a most excellent opportunity for observing the rate of invasion and ecesis. In both of these studies, the dates of repairing were obtained from the owner and carefully recorded with other desirable data.

The studies described above have to do with lichens only. Another series was begun, nearly all of which have to do in part or wholly with other plants. A few of these which concern lichens and mosses wholly or mainly will be of interest. The first is as follows: A beech tree, one-half meter in diameter four feet from the base, fell in a storm July sixth, 1907. On the eighth of August, 1908, when the study began, the tree was perfectly sound toward the base, but showed some evidence of having rotted somewhat toward the top before it fell. There was a considerable amount of a *pyrenomyces* on the upper one-fourth of the tree, and in all probability this fungus was growing before the tree fell. The tree was uprooted in such a way that the trunk was left intact so that no fungi could gain entrance at the base, and at the time of the first study none were growing about the exposed roots. *Parmelia caperata*, *Parmelia Borreri*, and *Trypethelium virens* were growing toward the base of the tree, the foliose ones sparingly, the crustose spe-

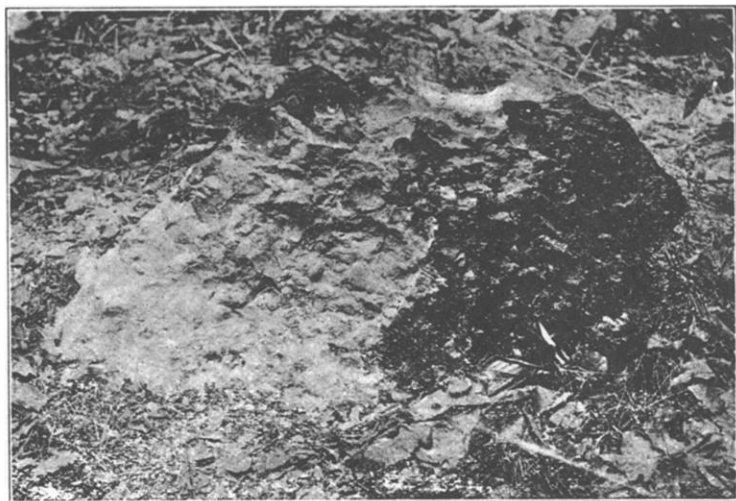


FIG. 2. *Verrucaria nigrescens* on rock.

cies abundantly. The latter was also growing abundantly all the way up the trunk, nearly to the top, and also on some of the larger branches. A moss was also growing rather sparingly three-fourths of the way up the trunk of the tree. It was impossible to make a minute study of the whole trunk of the fallen tree, but an area thirty by one hundred cm. and containing some areas of lichens and mosses which were carefully located, was marked on the bark for future detailed study of succession. Two other areas were marked in the same manner, using small nails and cord, and making similar records of conditions within the areas. The study of rate of decay of this tree and others similarly studied, with observation of successions of plants upon them will surely be interesting and it is hoped may also contribute some data of value. In all such studies, specimens of the plants of each succession will be carefully preserved.

For the fifth study of the second series, a limestone rock was selected one-third meter square and eight cm. thick, lying flat on the ground in the shade and densely covered on the upper surface with *Grimmia apocarpa* Fig. 1. A portion of the surface of the rock was chipped off, one-half to two cm. deep, so that any succession upon the chipped surface must be a primary one. Study number seven is a similar limestone rock, but standing nearly perpendicular, nearly all above ground, and covered on the exposed sides and edges with the lichen, *Verrucaria nigrescens*. Fig. 2. Half of the surface was chipped in the same manner as in study number five, so that the rate and manner of invasion and ecesis may be studied.

Other studies were made of lichens and mosses on ledges of rocks and on large and small boulders in varying conditions of environment, but enough has been recorded to illustrate the methods employed.

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